staging occurred, but were not different by study arm. Surgical resection rate was 49/71 in A, and 43/71 in B, with total margin status of 83 R0, 6 R1 and 3 R2, which by study arm was A 45:2:2 and B 38:4:1, p=0.6. Grades of AE, stoma-related events, non-stoma-related surgical complications, and lab work were similar.

Conclusions: Differences in surgical resection rates (69% vs. 60%), R0 pathological margins (62% vs. 52%), and overall survival (63% and 55%) were not statistically significant, while relative safety was demonstrated for short-course RT. With a mean follow-up of 1.5 years, the preliminary results of this trial do not show a significant difference between randomization arms. An operability rate of 60% is important for a group of patients deemed inoperable/borderline at diagnosis in this group of developing countries.

OC-0191

IAEA randomised trial of optimal single dose radiotherapy in the treatment of painful bone metastases

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Purpose/Objective: Single dose radiotherapy is standard treatment for painful bone metastases but the optimal dose remains incertain. This multi-centre, international, randomised radiotherapy trial compared a single dose of 8 Gy (n = 325) with that of 4 Gy (n = 326) to relieve pain arising from a single bone metastasis.

Materials and Methods: Patients aged ≥ 18 years with bone pain, a histological diagnosis of malignancy, radiological evidence of bone metastasis at the site of pain and a life expectancy of ≥ 12 weeks were eligible. Exclusion criteria were myeloma, bone metastasis in previously irradiated sites, previous radioisotope treatment, or complicated bone metastasis.

Pain relief at baseline, 4, 8, 12, 24 and 52 weeks was assessed using a Categorical Scale (CS) and a Visual Analogue Scale (VAS). The primary endpoint was the difference in the proportion of responders at 4 weeks.

Results: There were 325 patients randomized to the 8Gy arm and 326 to the 4Gy arm with no significant difference in the distribution of demographic features or other co-variates between dose groups.

Table 1 shows crude incidence of pain relief (all follow-ups) and prevalence at 4 weeks for CR, PR, NR and OR. There was a significant difference between dose groups when a global comparison was made for all follow-up times.. At the other intervals (8 to 52 weeks) both CRs and ORR was higher after 8 Gy (statistically significant only at 8 weeks got CR; *p = 0.03* and at 8 and 52 weeks (*p = 0.03 for OR*Table 1 also summarises pain relief using the VAS method. Overall incidence and 4-week prevalence of pain relief was significantly higher after 8 Gy.

The Kaplan-Meier actuarial rate (categorical scale) at 4 weeks showed no significant difference in CR. The ORR was 80% after 8 Gy compared to 68% after 4 Gy (log rank *p = 0.0015*).

A total of 117 of re-treatments were given of which 72 were in the 4 Gy dose group and 45 in the 8 Gy arm (*p = 0.01*).

Table 1. Incidence (all follow-ups) and prevalence at 4 weeks of response to pain for patients with complete (CR), partial (PR), no (NR) and overall response (OR) using the categorical (CS) and visual analogue (VAS) scales.

Table 1. Incidence (all follow-ups) and prevalence at 4 weeks of response to pain for patients with complete (CR), partial (PR), no (NR) and overall response (OR) using the categorical (CS) and visual analogue (VAS) scales.

CS	CR	*2-t p*	PR	*2-t p*	NR	*2-t p*	OR	*2-t p*
All follow-ups								
Arm 1: 4 Gy	399 (48%)	*0.02*	269 (32%)	*0.3*	170 (21%)	*<0.0001*	668 (80%)	*<0.0001*
Arm 2: 8 Gy	507 (53%)		330 (35%)		115 (12%)		837 (88%)	
Week 4								
Arm 1: 4 Gy	87 (33%)	*0.8*	99 (38%)	*0.02*	74 (28%)	*0.002*	*186 (71%)*	*0.002*
Arm 2: 8 Gy	95 (35%)		132 (48%)		47 (17%)		*227 (83%)*	
VAS	**CR**	***2-t p***	**PR**	***2-t p***	**NR**	***2-t p***	**OR**	***2-t p***
All follow-ups								
Arm 1: 4 Gy	69 (8%)	*0.05*	648 (78%)	*0.6*	119 (14%)	*0.01*	717 (86%)	*0.01*
Arm 2: 8 Gy	104 (11%)		744 (79%)		98 (10%)		848 (90%)	
Week 4								
Arm 1: 4 Gy	10 (4%)	*0.006*	203 (78%)	*0.6*	47 (18%)	*0.2*	213 (82%)	*0.2*
Arm 2: 8 Gy	28 (10%)		209 (76%)		38 (13%)		237 (86%)	

Conclusions: In a wide range of healthcare settings single dose radiotherapy is highly effective at achieving pain relief. Overall 8Gy is associated with a higher probability of pain relief from metastatic bone pain than 4Gy but there was still a high likelihood of pain response after the lower dose of 4 Gy [71% (CS) and 82% VAS] although a significantly higher retreatment rate after 4Gy.

OC-0192

Optimal radiotherapy utilization rate in developing countries: an IAEA study

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Purpose/Objective: Optimal radiotherapy utilization (RTU) rate has been studied for developed countries following an evidence-based, criterion-based method or based on assessment of current practice. In Australia, it has been determined to be 52.3% in 2003 later adjusted to 48.3% in 2012.

For developing countries, current estimates of the proportion of cancer patients who require radiotherapy can be estimated from the distribution of cancer types and stages. The purpose of this project was to assess the optimal RTU rates in 9 middle-income countries, following an evidence based method.

Materials and Methods: Nine middle-income countries were selected to participate in this assessment.

International guidelines were reviewed for external beam radiotherapy indications. Epidemiological data on the proportion of new cases of cancer with indication for radiotherapy specifically for the 9 target countries were identified. Indications and epidemiological data were merged to develop an optimal radiotherapy utilisation tree following the Collaboration for Cancer Outcomes Research and Evaluation (CCORE) method. Univariate and Monte Carlo simulations were used in sensitivity analysis. Globocan-2012 lists 27 tumour types and there is a difference between the total for the individual tumour sites and the total number of cancers reported overall. The database does not report a separate ‘unknown’ category. The difference between the total cancer cases and the sum of the 27 identified cancer types is a combination of ‘other’ and ‘unknown’ cancers. ‘Other’ and ‘unknown’ are split roughly 50:50 in Australia where 'other' has an optimal RTU rate of 19% and 'unknown' of 61%. The average is thus 40%. We have assumed this is the same in the 9 target countries. It is probably an underestimate as there are likely to be higher proportions of unknown in middle income countries.

This project also includes a prospective direct assessment of the actual RTU rates in these countries and the results will be reported separately.

Results: The optimal overall RTU rates found for the target countries were: Costa Rica 47%, Ghana 50%, Malaysia 52%, Philippines 52%, Romania 51%, Serbia 53%, Slovenia 48%, Tunisia 54% and Uruguay 51%. The mean value was 51%.

There was a difference of 7% between the lowest optimal RTU in Costa Rica (47%) and the highest in Tunisia (54%). This difference may be due to the incidence of three types of cancers treatable with radiotherapy and which have a lower incidence in Costa Rica than in Tunisia: bladder (1.8% vs. 6.5%), lung (6.6% vs. 20.0%) and nasopharynx (0.8% vs. 3.8%). 27.4% of all cancers in Ghana were cervix ca. with colorectal 1.7%. However, the category 'other and unknown' in Ghana was 11.5% probably reflecting issues with cancer registration.

Conclusions: The optimal RTU rate in this group of 9 middle-income countries did not differ significantly from that found in higher income countries.

OC-0193

Current radiotherapy capacity in post-Soviet countries; an IAEA survey

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Purpose/Objective: The IAEA is assessing the current capacity and quality of radiotherapy (RT) services in post-Soviet countries. We can now report on the current infrastructure in 12 countries in terms of number of facilities, equipment and staffing. The countries are: Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.

Materials and Methods: In June 2012, Country Coordinators (CC) were identified. The CC had to provide: [1] infrastructure and quality indicators (QI) on their respective country, [2] infrastructure and QI on their own RT centre and [3] infrastructure and QI on other RT centres in their country. The survey questionnaire was adapted from two validated sets of QI for RT.

The third and final phase of the Project consists of collection and analysis of QI on most RT centres in these 12 countries and this will be reported separately.

Results: The overall data on RT infrastructure of 12 countries as reported by the CCs is presented in Table 1.

The total number of RT centres is 250 with the Russian Federation having 144 centres, and Ukraine 52.

The calculated number of TT machines/1M inhabitants was 2.1 but varied widely from 0.1 in Tajikistan to 2.8 in the Russian Federation. The calculated number of TT machines per 1000 new cases/year was 0.8 but varied from 0.14 in TAJ to 1 in Turkmenistan, 0.77 in RUS and 0.75 in UKR.

The organization of RT services usually includes a leading cancer centre with research capacity, large RT centres in large cities and smaller provincial centres. The group presents heterogeneity in that some metropolitan centres operate with modern equipment, while the majority rely on stand-alone Cobalt-60 machines.

Assessment of staff levels was challenging since countries use professional designations and tasks which do not correspond to those in the west. In some countries, a 'radiologist' is licensed to read imaging studies, deliver radiotherapy and practice nuclear medicine. The profession of radiation therapist (RTT) is not well defined and the training path is minimal. The operation of treatment machines is done by